Season 6, Episode 5: **Filtration Strategies for Barn Biosecurity**

Dr. Brett Ramirez, Associate Professor, Iowa State University, shares practical ways barns can be modified to improve filtration without sacrificing efficiency and tips for troubleshooting common challenges.

Background

Barn filtration has become an increasingly important tool in swine production as producers look for ways to reduce the spread of diseases such as Porcine Reproductive and Respiratory Syndrome Virus (PRRSV). While filtration is a significant investment, it can play a critical role in protecting herd health and maintaining productivity when incorporated into a strong biosecurity program. Effective systems require careful planning, proper design, and ongoing management to ensure barns not only prevent disease entry but also provide a comfortable environment for pigs.

Filtration Systems and Design Considerations

Two types of filtered barns are commonly used: negative pressure and positive pressure systems. Negative pressure barns function similarly to traditional ventilation by pulling air through filters and exhausting it with fans, making it easier to manage and maintain. Positive pressure barns push clean, filtered air into tightly sealed buildings, reducing the chance of unfiltered air seeping inside. Both systems can work effectively if barns are built tight and filters, fans, and inlets are properly sized to minimize leakage and airflow resistance.

Key Challenges in Filtration

One of the biggest design challenges is static pressure, which builds at each stage of the system—from filters to pads to inlets—and affects ventilation performance. If fans are not properly sized to handle the added resistance, barns can fail to achieve adequate air exchange, reducing both biosecurity and pig performance. Air distribution is another concern, especially in large positive pressure barns where uniform airflow across all spaces can be difficult to maintain. Seasonal wind patterns also create complications, as wind back drafting can push unfiltered air into barns. Windbreaks around exhaust openings are increasingly used, though ongoing research is identifying the most effective solutions.

Practical Guidance and Takeaways for Producers

Filtration is most effective as the final layer of a comprehensive biosecurity plan that includes shower-in/shower-out protocols, Danish entry systems, and strict sanitation practices. Selecting the right filters is also essential. Filters are rated on the MERV (Minimum Efficiency Reporting Value) scale, which measures their ability to trap particles. Sow farms commonly use MERV 15 or 16 filters, which capture over 95 percent of small particles likely to carry viruses. Pairing these with pre-filters helps protect the more expensive secondary filters from clogging. When capital is limited, upgrading to higher-capacity fans and expanding pad or inlet areas are two of the most cost-effective ways to improve air quality.

Filtration can deliver significant protection against airborne disease, but its success depends on barn design, proper management, and integration into a complete biosecurity program. Producers should carefully evaluate fan sizing, filter ratings, barn tightness, and airflow distribution to ensure systems function as intended. Investing in the right infrastructure today can safeguard herds, reduce disease risk, and provide a more stable production environment well into the future.

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